US005692656A

United States Patent [19]

Dembicks

[11] **Patent Number: 5,692,656**

[45] **Date of Patent: Dec. 2, 1997**

[54] **TOOL CARRIER**

[76] Inventor: **Andrew E. Dembicks**, 5308 Boca Raton Marina Cir. North, Boca Raton, Fla. 33487

[21] Appl. No.: **657,867**

[22] Filed: **May 31, 1996**

[51] **Int. Cl.**[6] **A45F 5/00**; B65D 73/00

[52] **U.S. Cl.** **224/249**; 224/584; 224/673; 224/677; 224/904; 206/377; 206/443; 206/485; 206/806

[58] **Field of Search** 224/249, 584, 224/673, 677, 904, 918; 206/443, 377, 378, 485, 815, 372, 806; 211/70.6

[56] **References Cited**

U.S. PATENT DOCUMENTS

470,567	3/1892	Hitch .	
1,927,110	9/1933	Bannister et al. .	
2,112,339	3/1938	Kasparek	224/249
2,503,518	4/1950	Slaughter .	
2,833,419	5/1958	Trumpy	211/60
2,855,107	10/1958	Roth	211/60
3,830,415	8/1974	Jacobson et al.	224/918
3,978,984	9/1976	Cowley	206/443
4,101,025	7/1978	Jordan	206/377
4,813,551	3/1989	Kuo	211/70
5,368,161	11/1994	Plais	206/369

Primary Examiner—Linda J. Sholl
Attorney, Agent, or Firm—Quarles & Brady

[57] **ABSTRACT**

A tool carrier suitable for displaying tools for merchandising includes a plurality of downwardly extending flexible strips having vertically opposed holes through which tool shafts may be inserted when the strips are flexed. Release of the flexure causes the hole walls to grip the tool shaft, firmly holding the tools for ready access and display.

11 Claims, 1 Drawing Sheet

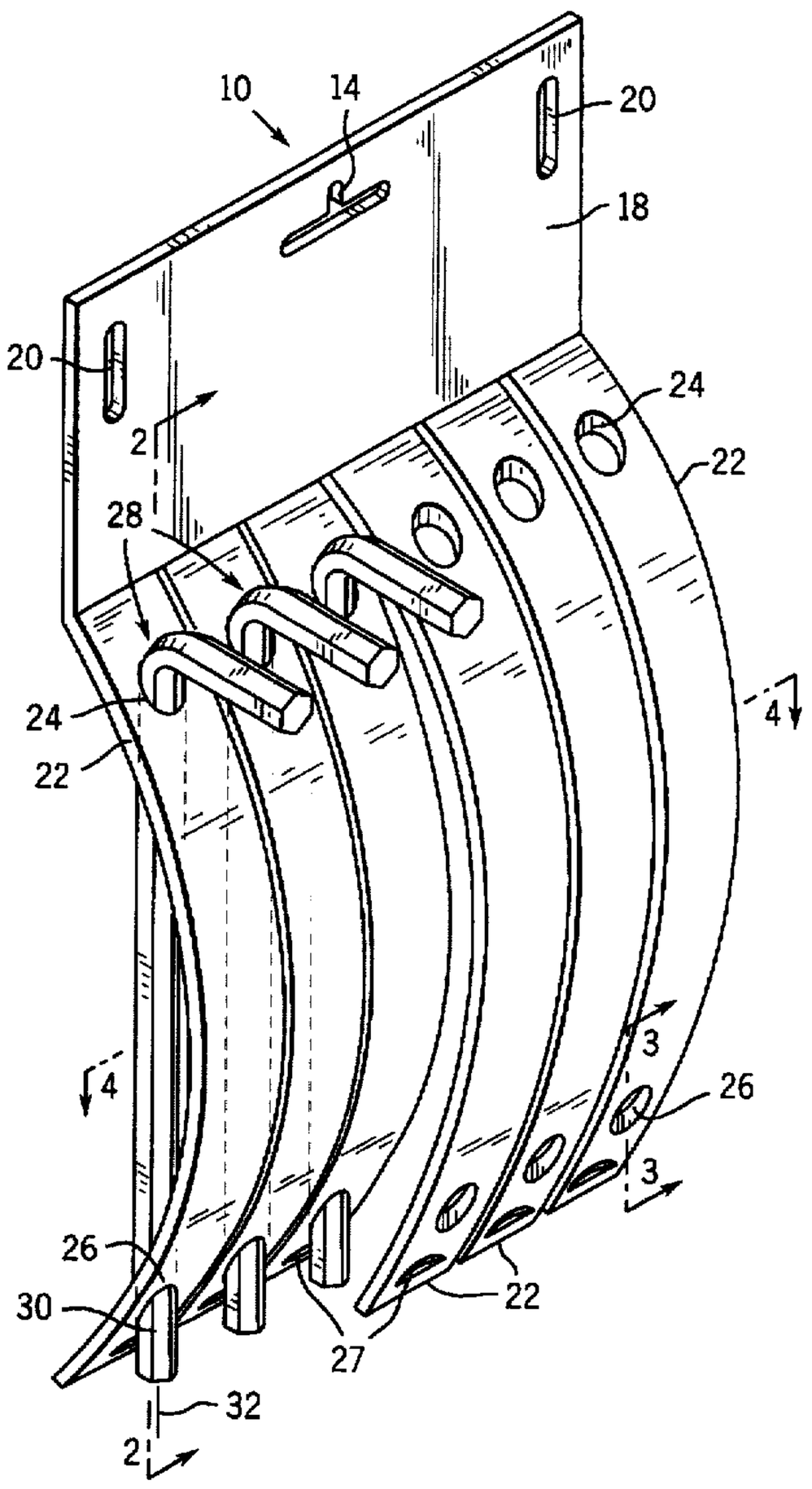


FIG. 1

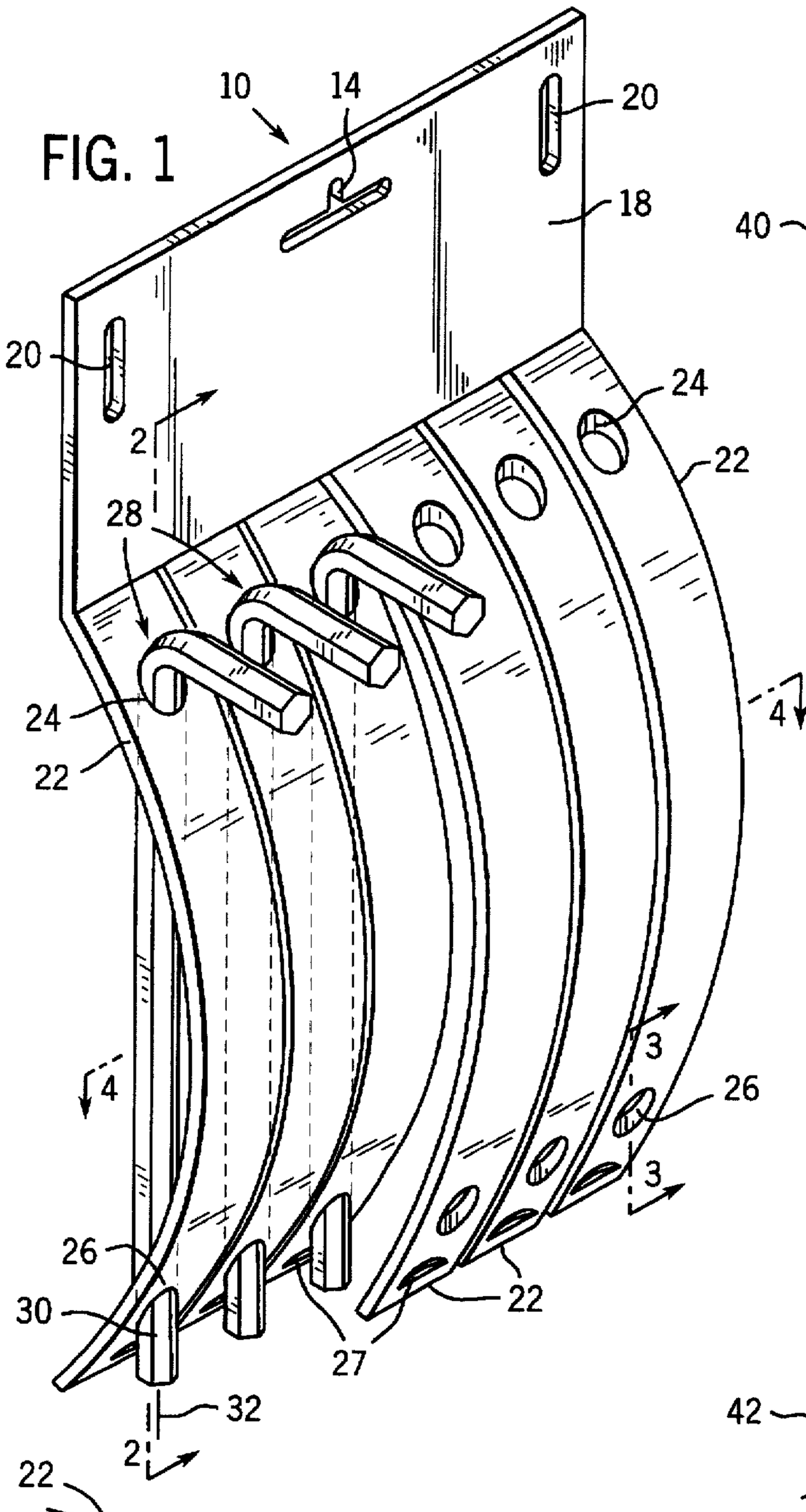
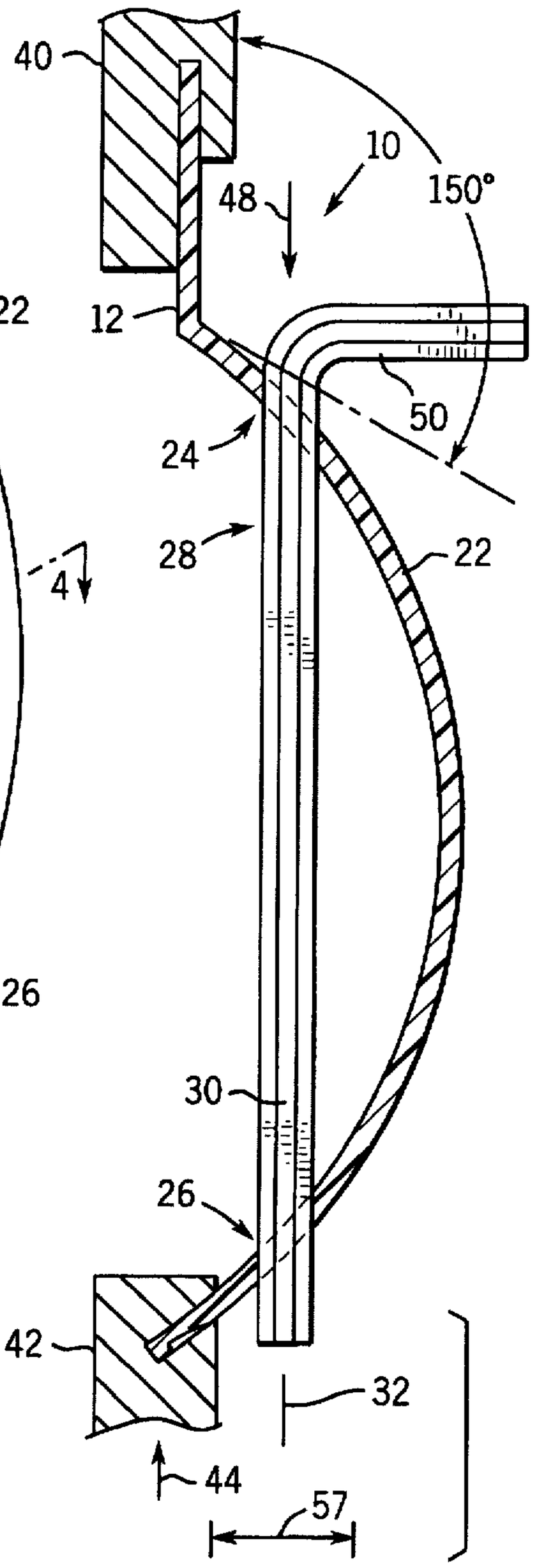


FIG. 3

FIG. 2



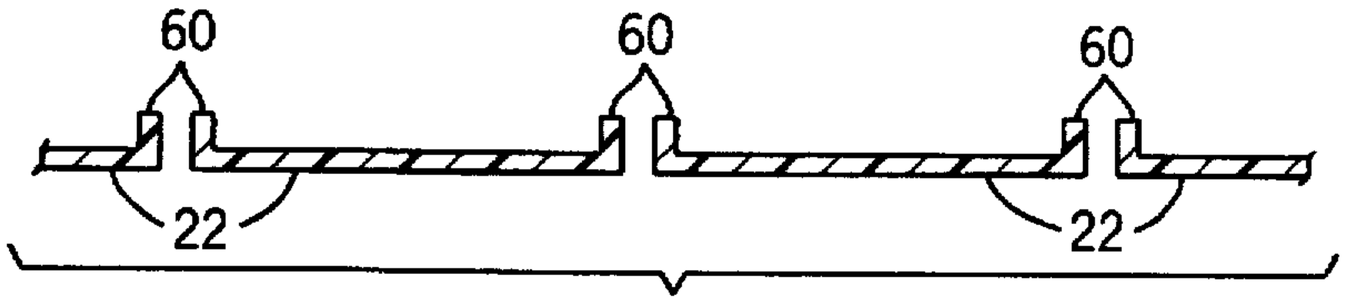


FIG. 4

TOOL CARRIER

FIELD OF THE INVENTION

The invention relates to tool carriers and in particular to a tool carrier suitable for both merchandising and storing tools.

BACKGROUND OF THE INVENTION

Tool sets such as hex wrenches, screw and nut drivers, and drill bits and flat wrenches are frequently stored in an index which holds the tools in a separated, orderly manner so that they can be easily selected and, in the case of cutting tools, so that the cutting edges of the tools are prevented from striking each other and being damaged. The index may, for example, be a molded plastic clam-shell case having a series of clips or holes into which are tools may be fitted.

Although such indices way work well for storing tools, their construction limits ready access to the tools. Nor are such indices well stilted for merchandising because the tools are not readily visible to the customer or well presented. Conventional tool storage indices are also relatively expensive to produce and thus substantially increase the cost of the tools to the customer.

For these reasons, tool sets, such as those described above are often sold in vinyl pouches having a clear front panel heat sealed along lines to a backer sheet so as to form a plurality of pockets into which the tools may be placed and seen.

Unfortunately, such vinyl pouches are easily damaged and thus do not serve well for storage of the tools after they are purchased. The products of combustion of vinyl are hazardous, thus making its use for packaging undesirable.

SUMMARY OF THE INVENTION

The present invention provides a tool carrier for tool sets which my serve both as a merchandising display and a storage unit for the tools after they are purchased. In the latter capacity, the invention provides ready access to the tools and may be easily carried by the user, for example, on a belt.

Specifically, the carrier includes a hanger having a transversely extending lower edge. A plurality of flexible strips having upper edges and lower edges are attached at transversely separated positions along the edges of this hanger, each strip having a pair of longitudinally separated holes sized to receive the shaft of the tool when the flexible strip is flexed into an arc along its longitudinal axis.

It is thus one object of the invention to provide a tool carrier that may also serve to display the tools for sale. The flexible strips separate and hold the tools for storage in an attractive manner for viewing by a customer. The carrier may be molded at low cost so as to not unduly increase the cost of the tool set, and yet is rugged to provide reuse and storage for the tools after they are purchased.

The hanger extends along a plane and the flexible strips are attached to the hanger to form an obtuse angle with the plane so that the shafts of the tools when inserted into the holes extend substantially parallel to the plane. The hanger my include first and second slots opposed along the transverse axis for receiving a belt.

It is another object of the invention to provide a tool carrier that has a thin profile and thus that conserves space when hung on display pegs in stores and that can be conveniently carried on a user's belt.

The foregoing and other objects and advantages of the invention will appear from the following description. In this description, reference is made to the accompanying drawings which form a part hereof and in which there is shown by way of illustration, a preferred embodiment of the invention. Such embodiment does not necessarily represent the full scope of the invention, however, and reference must be made therefore to the claims for interpreting the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front perspective view of the tool carrier of the present invention showing tools loaded into three carrier strips flexed into an arc to admit those tools and showing three carrier strips not loaded with tools and having less or no flexure;

FIG. **2** is a cross-sectional view along line **2—2** of FIG. **1** showing flexure of the carrier strips by tool loading equipment to permit the insertion of tools into the tool carrier;

FIG. **3** is a cross-sectional view along line **3—3** of FIG. **2** through one hole in a carrier strip and showing the angled walls of the hole and the mating mold tools necessary to injection mold this hole in a simple two-part mold; and

FIG. **4** is a cross-sectional view of the carrier strips of FIG. **1** taken along line **4—4**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. **1**, a tool carrier **10** of the present invention includes a generally rectangular, planar hanger **12** having centered at an upper edge a standard hang card hole **14** for fitting on rack displays of retail merchants. The hanger **12** also includes a product label area **18** on which a label may be placed or hot stamped identifying the tools **28** loaded into the carrier **10** and a price.

At transversely opposed left and right edges of the hanger **12**, there are vertically extending belt loop slots **20** which permit a user to thread his or her belt through the slots **20** so that the hanger **12** may hang vertically down from the belt allowing ready access to the tools **28** of the carrier **10** at a work site.

Attached to and extending downward from a lower transverse cage of the hanger **12** are a series of longitudinally extending carrier strips **22**. Each carrier strip **22** has an upper and lower hole **24** and **26**, respectively, cut through its surface, with hole **24** positioned near a top of each carrier strip **22** and hole **26** positioned near a bottom of each carrier strip **22**.

Shaft portions **30** of the tools **28** may be inserted through the holes **24** and **26** when the carrier strip is flexed into an arc so that holes **24** and **26** align along an insertion axis **32**. Specifically, the shaft **30** of the tool **28** is inserted from the front of the carrier strip **22** through the upper hole **24** to pass to the back of the carrier strip **22** then to be received through hole **26** and pass to the front of the carrier strip **22**. When so inserted, the top and bottom of the tool **28** are dearly visible.

After the tool **28** is inserted into the carrier strip **22**, and the carrier strip **22** is released, it straightens to a lesser arc thereby capturing the tool **28** against the edges of the holes **24** and **26**.

At the lower edge of each carrier strip **22** is an debossment **27** which provides purchase for the fingers of the user when it is necessary to flex the carrier strip **22** to insert or remove the tools **28**. To remove the tool **28**, the user grasps the lower

end of the carrier strip **22** at the debossment **27** (the hanger **12** being suitably restrained, for example, by the user's belt) and flexes the carrier strip **22** to realign the holes **24** and **26** reducing the fictional contact between the carrier strip **22** and the tool shaft **30** allowing the tool **28** to be easily removed.

The carrier strips **22** are generally spaced evenly along the lower transverse edge of the hanger **12**, however, the transverse width of the carrier strips **22** may be varied according generally to the diameter of the shaft **30** of the tool and a possible width of a handle or the like of the tool **28**. Generally the wider carrier strips **22** will provide somewhat more gripping force to the tool because of the greater spring force offered by additional area of material.

Referring now to FIG. **2**, the hanger **12** extends along a plane and at its point of attachment to the carrier strips **22** forms an angle of approximately but not limited to 150 degrees (measured between the plane of the hanger **12** and a longitudinally extending tangent **34** starting at the point of attachment of the carrier strip **22** to the hanger **12**). This angle plus the catenary arc of the carrier strip **22**, when the tool **28** is inserted through holes **24** and **26**, causes the tool shaft **30** to extend along the axis substantially parallel to the hanger **12**. Thus the tools hang in an attractive vertical orientation when the hanger **12** is hung from the hang card hole **14**. Similarly, the tools lie flat at a user's side when the hanger **12** is suspended on the user'belt through slots **20**.

The initial insertion of the tool **28** into the carrier **10** is accomplished by a tool having opposed finger plates **40** and **42**, finger plate **40** grasping the hanger **12** at its upper edge and finger plate **42** capturing the lower edges of the carrier strips **22**. The finger plates **40** and **42** may move inward toward each other generally along the plane of the hanger **12** as held.

The finger plate **42** allows flexure of the end of the carrier strip **22** away from the plane of the plates **40** and **42** by an angle comparable to that between the hanger **12** and the upper edge of the carrier strip **22**. Accordingly, as plate **42** is moved toward plate **40**, the carrier strip **22** bends into a catenary arch aligning holes **24** and **26** so that the straight shaft **30** of the tool **28** may be easily inserted through these holes as described. By controlling the mount of movement of plates **40** and **42**, the amount of curvature may be precisely controlled.

Each hole **24** and **26** is ellipsoidal so that when the carrier strip **22** is so flexed into an arch, the projected area of the holes **24** and **26** onto a plane perpendicular to the insertion axis **32** is substantially circular and of diameter sufficient to allow the tool to easily slide through the holes **24** and **26**.

Referring now to FIG. **3**, the walls **46** of the holes **24** and **26** are sloped so as to be aligned with the axis **32** when the carrier strip **22** is flexed into its proper arched shape for tool insertion.

Referring also to FIG. **2**, after the shafts **10** of the tools **28** are inserted along the direction indicated by arrow **48**, plates **40** and **44** are separated and the carrier strip **22** straightens as a result of its natural resilience to a lesser curvature shown generally in FIG. **1** by the carrier strips **22** not containing tools **28**. This straightening causes the walls **46** of the holes **26** to press against the shafts **30** of the tool **28** gripping the tool within the holes **24** and **26** so that they do not slip out. The retention of the tools **28** in the carrier **10** is also ensured by placing any head **50** of the tool **28**, too large to easily fit through the holes **24**, toward the top of the carrier **10**.

The holes **24** and **26** are longer in the longitudinal dimension than in the transverse dimension and in the transverse dimension they are substantially equal to the width of the shaft **30** to resist transverse looseness of the tools **28** when the tools are held in the carrier strips **22**. As the carrier strips **22** straighten out, the effective projected area of the larger dimension of the holes **24** and **26** is reduced eliminating any looseness of the tool **28** forward and backward.

The carrier **10** of the present invention may be readily injection molded of polypropylene with a simple and inexpensive two-part mold. This is not only because of the generally planar aspect of carrier **10** but because all undercuts and high relief bends are eliminated. The potential undercutting of the holes **24** and **26** having sloped walls **46** is eliminated as indicated in FIG. **3** in a two-part mold having a top mold part **52** and a bottom mold part **54**, by having each part extend somewhat into the holes **26** so that downwardly facing wall **46**, which might be an undercut with respect to top mold part **52**, may be formed by an upward projection from bottom mold part **54** and upwardly facing wall **46'** which might be an undercut with respect to bottom mold part **54** may be handled by a downward projection from top mold part **52**. The two mold parts **54** and **52** may join with proper relief at the center of the hole as indicated by interface **56**. The carrier strips **22** may be molded flat or with a slight radius of curvature greater than that to which the carrier strips **22** must be flexed in order to permit insertion of the tool shaft **28**. The longitudinal length of holes **24** and **26** arc computed to minimize merchandising height **57**.

Referring now to FIG. **4**, a rear face of the downwardly extending flexible strips **22** may support outwardly extending ribs **60** giving each strip **22** a generally U-shaped cross section to increase its resistance to bending and thus to increase the force with which the holes **24** and **26** (shown in FIG. **1**) grasp the tool **30**.

The above description has been that of a preferred embodiment of the present invention. It will occur to those that practice the art that many modifications may be made without departing from the spirit and scope of the invention. For example, it will be recognized that the carrier **10** of the present invention may be manufactured by other means including die cutting from a single sheet of polypropylene with the holes separately die cut at angles or the sloped walls feature eliminated and thus the present invention, although readily manufactured inexpensively should not be considered limited to a particular manufacturing method. Further, a wide range of polymeric materials may be used to manufacture the carrier. Polypropylene is however preferred because of the material's inherent memory its flexure modulus, and resistance to stress cracking under load. Of course, it will be apparent that the present invention may be used with a wide variety of tools and not simply the hex wrenches shown in FIGS. **1** and **2**.

In order to apprise the public of the various embodiments that may fall within the scope of the invention, the following claims are made:

I claim:

1. A carrier for tools with tool shafts, the carrier comprising:

a hanger having a transversely extending edge;

a plurality of flexible carrier strips having upper edges and lower edges opposed along a longitudinal axis, the upper edges of the carrier strips attached at transversely separated positions to the transversely extending cage of the hanger, each carrier strip further having a pair of longitudinally separated holes sized to receive the shaft

of the tool when the flexible carrier strip is flexed into an arc along its longitudinal axis.

2. The carrier of claim **1** wherein the holes are ellipsoidal to project substantially to circles on a plane perpendicular to the tool shaft when the flexible carrier strips are flexed in the arc and the tool shafts are inserted through the holes.

3. The carrier of claim **1** wherein the holes have a transverse width substantially equal to the width of the tool shafts and a longitudinal width greater than the width of the tool shafts.

4. The carrier of claim **1** wherein the walls of the holes are substantially parallel to an axis extending the length of the tool shafts when the flexible carrier strips are flexed in the arc and the tool shafts are inserted through the holes.

5. The carrier of claim **1** wherein the hanger extends along a plane and wherein upper edges of the flexible carrier strips are attached to the hanger to form an obtuse angle with the plane such that the shafts of the tools extend substantially parallel to the plane when the flexible carrier strips are flexed in the arc and the tool shafts are inserted through the holes.

6. The carrier of claim **1** wherein the hanger includes a first and second longitudinally extending slot opposed along a transverse axis for receiving a belt.

7. The carrier of claim **1** wherein the hanger includes a hang card hole positioned on the center of gravity of the loaded carrier.

8. The carrier of claim **1** wherein the lower edges of the carrier strips include an debossment positioned and sized to be grasped between a user's fingers.

9. The carrier of claim **1** wherein the hanger and the flexible fingers are molded as a single thermoplastic part.

10. The carrier of claim **1** wherein the flexible fingers include ribs increasing their resistance to bending along the longitudinal axis.

11. A method of loading tools in a carrier, the tools having tool shafts, the carrier including a hanger having a transversely extending edge and a plurality of flexible carrier strips having upper edges and lower edges opposed along a longitudinal axis, the upper edges of the carrier strips attached at transversely separated positions to the transversely extending edge of the hanger, each carrier strip further having a pair of longitudinally separated holes, the method comprising the steps of:

bending the flexible carrier strips into an arc so that the longitudinally separated holes lie on a straight line axis and present an area perpendicular to the straight line axis sufficient to admit the tool shaft;

aligning the tool shaft with the straight line axis and moving the tools along the straight line axis to thread the tool shaft through both holes; and

releasing the flexible carrier strips so that they may straighten and clamp the tool shaft between opposing walls of the holes.

* * * * *